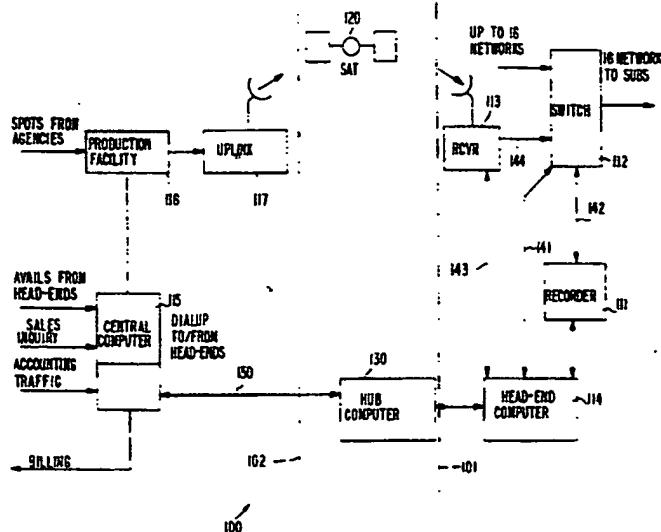




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(54) Title: ADDRESSABLE VIDEO FEED SYSTEM



(57) Abstract

A novel cable interconnect system (100) is taught, that provides for the overnight delivery of advertising messages to optical disc libraries located at cable headends and for the automated and customized insertion of ads on a plurality of cable systems throughout a wide geographic area. A verification and accounting system is taught which provides ad run verification and accounting information. The cable interconnect enables the delivery of commercial messages, for example via satellite (120), on an overnight basis from a central control facility (102) to cable television system headends (101) located in any desired geographic area such that a large number of cable television systems can receive the video ads simultaneously.

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7 ADDRESSABLE VIDEO FEED SYSTEM

8

9 INTRODUCTION

10 Technical Field

11 This invention pertains to video systems and
12 more specifically to the video systems for addressably
13 downloading selective video signals to a plurality of
14 remote sites, for example, for use in inserting desired
15 commercials or other video matter into one or more
16 network feeds at a plurality of remote locations.

17

18 Background

19 The procedures for purchasing cable time for
20 advertising messages and the related production and
21 verification process for these purchases is currently
22 adequate for national network advertisers. However, the
23 procedures for the purchase of spot time on individual
24 cable systems is cumbersome, inefficient and, in
25 instances, nonexistent. A significant spot advertising
26 purchase on cable involves dealing with numerous cable
27 system operators. To purchase a spot program on cable
28 that would reach a majority of subscribers in the top 30
29 markets in the United States would require an
30 advertising agency to deal with approximately 500
31 individual cable systems--some of which do not now have
32 ad insertion equipment, or, in instances where they do,
33 are able to insert ads on only a limited number of
34 channels.

35 While certain cable systems are linked by
36 cable interconnects that make the process more
37 efficient, all of these interconnects cover only a
38 limited region and few of them have demonstrated
39 effective delivery capabilities. Advertising agencies
40 making a significant spot buy on cable television today
41 must deal with the mechanics of scheduling ads on

1 multiple systems and of physically delivering multiple
2 commercial ad tapes to systems and interconnects
3 located in remote locations throughout the country.

4 Another significant problem that advertisers
5 and their agency representatives currently confront with
6 spot advertising on cable is that the follow-up
7 verification and accounting systems of cable operators
8 and inter-connects are uniformly unacceptable.

9 Frequently agencies are unable to confirm that
10 commercial messages ran at a particular time on a
11 particular channel on a particular system. The receipt
12 of separate invoices from numerous cable operators and
13 inter-connects is another negative frequently cited by
14 advertising agencies.

15 It is known in the prior art to utilize ad
16 insertion equipment at cable television system headends
17 utilizing video tape storage media and computer control.
18 Such systems provide adequate video quality, but are not
19 random accessed video storage media. Thus, in one such
20 prior art system, a large plurality of video tape drives
21 are used and periodically loaded with adequate tapes for
22 a given period of time. In another prior art system,
23 advertisements are downloaded to the headends of more
24 than one cable system in a given region, but the
25 advertisements are downloaded serially and identically
26 at each cable television system headend, making it
27 difficult to custom tailor advertising needs of each
28 cable television system.

29

30 SUMMARY OF THE INVENTION

31 In accordance to the teachings of this
32 invention, a novel cable interconnect system is taught,
33 that provides for the overnight delivery of advertising
34 messages to optical disc libraries located at cable
35 headends and for the automated and customized insertion
36 of ads on a plurality of cable systems throughout a wide
37 geographic area. A verification and accounting system

1 is taught which provides ad run verification and
2 accounting information.

3 This cable interconnect enables the delivery
4 of commercial messages, for example via satellite, on an
5 overnight basis from a central control facility to cable
6 television system headends located in any desired
7 geographic area. In one embodiment, the interconnect
8 system is entirely automated at each cable system
9 headend.

10 The central control facility includes tape
11 editing and tagging equipment, some production
12 capability, and a video distribution capability for
13 periodic transmissions to participating cable headends.
14 In one embodiment, this video distribution is performed
15 via satellite such that a large number of cable
16 television systems can receive the video ads
17 simultaneously. In one embodiment of this invention,
18 these ads are transmitted at night, during low priority
19 transmission time. This central control facility also
20 contains a sophisticated traffic control system that
21 provides for ad run verification and for accounting and
22 invoicing. In one embodiment, this traffic control
23 provides that the ad run verification and accounting
24 and invoicing information is provided from the headends
25 to the central control facility on a daily basis.

26 Participating cable system headends include
27 video storage media, such as state-of-the-art "write
28 many" optical disc recorders/players, as well as
29 switching equipment and ad insertion equipment.
30 Controllers at the headends serve to communicate with
31 traffic control systems at the central control facility.
32

33 BRIEF DESCRIPTION OF THE DRAWINGS

34 Figure 1 is a block diagram depicting one
35 embodiment of this invention; and

36 Figure 2 is a diagram depicting one embodiment
37 of switch 112 of the embodiment of Figure 1.

1

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DESCRIPTION OF SPECIFIC EMBODIMENTS

3

4
System Operation

In operation, an advertiser who has purchased a cable spot advertising schedule need deliver only one videotape to central control facility 102, from which is made the distribution of the advertisement to all desired cable systems. Central control computer 115 uniquely "tags" the advertisement and places the tagged advertisement in a library of advertisements that will be delivered to cable system headends 101 on off-hour time through, for example, satellites. The use of one satellite allows total coverage of the Continental United States. The use of additional satellites allows coverage of other geographic areas, as might be desired. Leased telephone lines (not shown) allow central control facility 102 to inexpensively transmit instructions to a headend computer 114 at each headend location 101 as to which of the commercials on the transmitted library should be stored on that headend's recorder/player 111. Central control facility 102 also transmits to headend computer 114 specific instructions as to when and on what channel to play the recorded advertisements. Based on these instructions, ad insertion equipment automatically inserts advertisements at appropriate times.

Since ads are likely to be inserted on multiple cable channels at a given headend location, the same commercial message may be scheduled for different cable channels during closely approximate time sequences. Also, there may be instances when different commercial messages are scheduled to be aired at closely approximate times. Furthermore, there are certain cable networks where the timing of advertising "slots" is not predictable--for example, sports programs. While these time slots are set, they can and do vary based on

1 programming and technical uncertainties. In one
2 embodiment of this invention, recorder/player 111
3 comprises an optical disk device, as for example
4 available from Panasonic, which provides many important
5 advantages compared to prior art ad insertion equipment
6 which utilizes video tape recorders. In an alternative
7 embodiment, recorder/player 111 comprises computer disk
8 storage of digitized video. These advantages of the use
9 of optical disk or computer disk storage technology
10 include superior picture quality, significantly greater
11 reliability, and substantially faster shuttle time as
12 compared with video tape devices. The deminimus
13 "shuttle time" of optical disc technology, together with
14 ad insertion optimizing programs, virtually eliminates
15 the number of "make-goods" necessary for spots missed
16 due to player availability or collisions (breaktime
17 overlap). In certain high priority headends, two or
18 more optical discs are installed so as to further
19 reduce, if not eliminate, such collisions.

20 From the viewpoint of participating cable
21 operators, very little space at headend 101 is required
22 for this system and the system of this invention
23 requires no operating or maintenance time of the cable
24 operator's employees.

25 Verification equipment is placed at the
26 central control facility 102 and at headends 101 of
27 participating cable systems. This equipment enables
28 verification of when commercial messages were aired and
29 information for accounting and invoicing purposes. This
30 information typically includes title or other indicia of
31 the commercial played, and quality of the playback. In
32 one embodiment, this verification is performed within a
33 short period of time, for example, 24 hours. In this
34 embodiment, this next-day reporting surpasses the
35 current capabilities of the Broadcast industry and is of
36 vital interest to advertising agencies.

37 In accordance with the teachings of this
38 invention, national advertisers are provided with an on-

1 line inventory of local avails. This on-line inventory
2 of avails provides instantaneous information on what
3 local inventory is available and the pricing of this
4 inventory. With this on-line system, avail commitments
5 are easily and quickly provided to advertisers and their
6 agency representatives. The system of this invention
7 also offers advertisers a delivery system for cable
8 commercials that make a cable spot advertising purchase
9 easier and more efficient than a current Broadcast spot
10 purchase. The advertiser need deliver only one
11 commercial tape to the central control facility,
12 regardless of the number of locations that ultimately
13 will air the commercial. Advertisers can target smaller
14 geographic and demographic markets, they can more easily
15 effect cross-cable network advertising purchases, and
16 they can more efficiently conduct test marketing.
17 Advertisers are able to change commercial messages more
18 quickly in response to market reactions. The quality of
19 transmission provided by the satellite-to-optical disc
20 system provides consistently higher advertising video
21 quality than prior art which included the manual
22 delivery and use of multiple generation tape.

23

24 Hardware Description

25 Figure 1 is a diagram of one embodiment of a
26 system 100 constructed in accordance with the teachings
27 of this invention showing components at one headend 101
28 as well as central components at central control
29 facility 102.

30

31 Headend recorder/player

32 Video recorder/player 111 is capable of
33 recording commercials from an external source and
34 playing them back on command. In one embodiment, an
35 optical disc recorder/player is used as
36 video/recorder/player 111, providing playback quality
37 superior to that of currently used VTRs. One
38 embodiment of such an optical disk recorder/player is

1 available from Panasonic. The optical disk
2 recorder/player has the capability to be all or
3 partially erased on command and the erased disk area
4 rewritten. The set up time for the optical disk machine
5 is such that once a cue tone is received from the
6 network where a commercial is to be inserted there is
7 ample time to position the disk to the proper position
8 for play. This is also true for the write function.
9 The machine utilizes laser magneto optical disk
10 technology. The disk is arbitrarily segmented into 15
11 second units (30 frames per second). Commercials are
12 written into any available segment for future play-back.
13 Recorder/player 111 is under the control of headend
14 computer 114 and commands are executed based on computer
15 instructions. One or more recorder/player machines 111
16 are utilized at headend 101 depending on the commercial
17 needs. For example, for a typical cable system
18 utilizing fifteen (15) video channels, at least two
19 optical disks are preferably utilized so that great
20 flexibility is provided in allowing commercials to be
21 played simultaneously on more than one video channel,
22 and in rapid succession among various video channels.

23 Recorder/player 111 has a link 142 to video
24 switch 112 for video and audio insertion of a video spot
25 stored on recorder/player 111 on a network (play
26 function). Recorder/player 111 includes a link to
27 receiver 113 through switch 112 to record commercials on
28 the disk (record function). In one embodiment, the
29 interface between headend computer 114 and
30 recorder/player 111 is an RS-232 link that accepts
31 either individual control commands or a complete
32 program or script for execution. Such commands include,
33 for example, the position command, which positions
34 recorder/player 111 at the beginning of the desired
35 commercial, the play command, which plays the commercial
36 once positioned, and erase command and then the record
37 command, which records a new commercial from receiver
38 113 at a desired location on the recorder/player 111,

1 following positioning. Genlock to the network is
2 performed by recorder/player 111.

3 In one embodiment of this invention,
4 recorder/player 111 includes error detection codes for
5 the play, record, and position functions. If headend
6 computer 114 issues an erroneous command or if
7 recorder/player 111 cannot process a command or program,
8 recorder/player 111 returns an error code to headend
9 computer 114. Headend computer 114 is then responsible
10 for handling the error condition, such as by providing
11 another one or more instructions and/or sending an alarm
12 to central computer 115 located at central control
13 facility 102

14

15 Switch

16 Switch 112 allows both the record and play
17 functions to properly occur. In the record function,
18 switch 112 connects headend receiver 113 to
19 recorder/player 111. In the play function, switch 112
20 connects recorder/player 111 to the proper network for
21 commercial insertion. One embodiment of switch 112 is
22 shown in

23 Figure 2, and includes the following components:

24 1. Cross point grid 216

25 This set of cross points allows the
26 connection of sixteen networks per
27 headend computer to recorder/player
28 111. Receiver 113 and
29 recorder/player 111 utilize this
30 grid for the record and playback
31 functions, and Genlock.

32

33 2. Cue tone detector 217

34 This component monitors all networks
35 for a commercial insert cue tone and
36 passes this information to headend
37 computer 114.

38

1 3. Vertical interval detector (VID) 218
2 This component links up to the
3 either receiver (for recordings) or
4 (on playback) the network on which
5 an insertion is being performed.
6 This component passes the commercial
7 identifier information in the
8 commercial to headend computer 114.
9 These data are used to perform
10 proper accounting of the playing and
11 recording of commercials.
12

13 The sixteen networks at headend 101 that carry
14 commercials terminate the video, audio left, and audio
15 right feeds in the cross connect bridge. All traffic
16 passes through switch 112. Recorder/player 111 includes
17 audio and video termination from switch 112 for the
18 record function, and audio and video termination to
19 switch 112 for the ad insertion function. Receiver 113
20 includes an audio and video termination to switch 112
21 for the record function. Headend computer 114 includes
22 link 141 (such as an RS-232 link) to switch 112 for
23 passing data between the switch 112 and headend computer
24 114, including cue tone, commercial identifier, cross
25 point switch, and network information.

26

27 Receiver

28 Receiver 113 is utilized in the record
29 function. Receiver is tuned to the proper
30 satellite/transponder for commercial receipt. Receiver
31 113 includes video, audio left, and audio right links
32 144 to switch 112 which are terminated on one cross
33 point location of switch 112. When recording is to
34 occur, switch 112 (under control of headend computer 114
35 via link 141) cross connects receiver 113 to
36 recorder/player 111 to accomplish the record function.
37 In one embodiment, receiver 113 utilizes existing RF

1 signals from a headend owned and operated satellite
2 antenna and LNB.

3 In one embodiment, receiver 113 includes link
4 143 (such as an RS-232 connection) to headend computer
5 114 and is capable of receiving instructions as to which
6 transponder receiver 113 should be tuned to. In an
7 embodiment in which receiver 113 is remotely tunable,
8 headend computer 114 is capable of adjusting the
9 frequency of receiver 113 to allow reception from a
10 variety of transponders.

11

12 Headend Computer

13 Headend computer 114 is the controller of the
14 equipment of headend 101. Headend computer 114 is
15 capable of operating more than one switch 112 and
16 recorder/player 111. Headend computer 114 receives the
17 daily schedule from central computer 115, for example,
18 via leased or dial up telephone line. Based upon this
19 daily schedule, headend computer 114 determines what
20 commercials need to be erased from recorder/player 111
21 and executes instructions to recorder/player 111 in
22 order to erase those unneeded commercials. Headend
23 computer 114 also determines which commercials will be
24 received via receiver 113 and need to be recorded and
25 where they should be inserted on recorder/player 111.
26 Headend 114 also determines the desired
27 satellite/transponder and tunes receiver 113
28 accordingly. At the time for recording, headend
29 computer 114 monitors switch 112 via link 141. A
30 commercial identifier along with timing information is
31 passed for each commercial being sent via satellite 120
32 for recording. When headend computer 114 determines a
33 commercial received by receiver 113 needs to be recorded
34 by this cable system, recorded computer 114 sends a
35 message to recorder/player 111 to position it at the
36 proper recording frame. At the proper time headend
37 computer 114 instructs recorder/player 111 to begin
38 recording the received commercial and how many frames

1 to record. Headend 114 computer counts the frames being
2 recorded to ensure all frames are recorded properly.
3 This procedure is repeated for each commercial received
4 by receiver 13 which needs to be recorded for use by
5 this cable system.

6 During the daily commercial insertion time
7 window, headend computer 114 determines from the
8 schedule the sequence commercials need to be played, the
9 network they will be played on, and the time window for
10 the playing. When the cue tone is passed from switch
11 112 to the headend computer 114, headend computer 114
12 determines the correct timing for the commercial playing
13 and issues a play command to recorder/player 111 and a
14 cross point close command to switch 112. Switch 112
15 disconnects the network feed and substitutes the
16 commercial being played by recorder/player 111 and at
17 the same time passes the commercial frame identifiers
18 back to headend computer 114 via link 141 as the
19 commercial is playing. Headend computer 114 times the
20 commercial to determine when the commercial has
21 finished, at which time headend computer 114 instructs
22 switch 112 to return the cross point to the network.
23 Headend computer 114 verifies what frames were sent and
24 develops an execution report for real time or delayed
25 transmission to central computer 115. This sequence is
26 repeated for all commercials that need to be played for
27 a given period of time.

28 If a commercial does not play due to lack of
29 cue tone or a collision, headend computer 114 logs this
30 information. Periodically (for example, daily), central
31 computer 115 communicates to headend computer 114 the
32 schedule for the next time period. In one embodiment of
33 this invention, central computer 115 communicates this
34 information to computer 114 via a leased or dial up
35 telephone line. Headend computer 114 passes to central
36 computer 115 information indicating all commercials that
37 played as well as any commercials or frames that did not
38 play per schedule. Since satellite uplinks are

1 relatively expensive, headend computer 114 communicates
2 information to central computer 115 typically over
3 dialup or leased telephone lines and this communication
4 can take place at the same or different times as does
5 the schedule transmission from central computer 115 to
6 headend computer 114. In one embodiment, central
7 computer 115 makes telephone connection with headend
8 computer 114 to transmit the schedule for the next time
9 period, and then receives the reporting information from
10 headend computer 114 over the same communications link.
11 In one embodiment, hub computers 130 are installed
12 between central computer 115 and Headend computers 114
13 to be used as a Telecommunications concentrator.

14 In one embodiment, headend computer 114 is
15 capable of producing a report on a local monitor screen
16 of the schedule of commercials for the viewing by the
17 local headend operator, if required.

18

19 Error detection

20 Recorder/player 111 is capable of issuing a
21 series of error messages relating to all the commands
22 issued by headend computer 114. Headend computer 114 is
23 capable of determining if there is a problem with
24 recorder/player 111 and, if so, informs central computer
25 115 immediately. Headend computer 114 monitors the play
26 identifier information and determines if the process is
27 not operating properly and immediately notifies central
28 computer 115 and receiver 113. All commands to switch
29 112, recorder/player 111, and receiver 115 are
30 positively acknowledged by the receiving device.
31 Central computer 115 receives demand calls, for example
32 on dial up telephone lines, from headend computer 114
33 when there are immediate error reports to send.
34 Central computer 115 formats error reports for immediate
35 action when received from a headend computer 114.

36

1 Central computer

2 Central computer 115 is the main control
3 point, which stores all scheduling information for all
4 headends.. In one embodiment, this scheduling
5 information for all headends is stored in central
6 computer 115 for a predetermined period of time, for
7 example, for a rolling three month period. All availa
8 that are available to be sold are posted by headend, by
9 network, by hour. On a periodic (e.g., daily) basis
10 central computer 115 develops a list of all commercials
11 that need to be transmitted via the uplink that evening.
12 Central computer 115 transmits to each headend computer
13 114 the schedule for that headend for the next time
14 period. Each headend 114 responds with all the
15 information concerning the verification and error
16 reporting pertaining to the schedule for the prior time
17 period. Central computer 115 receives all record and
18 play error reports and formats these data for the
19 central control personnel. The central computer must
20 maintain a log of every disk and what commercials reside
21 at each headend, and at what disk location. This will
22 allow the central computer to tell each headend what to
23 erase and what to record on every day. This will also
24 allow the central computer to match the daily schedule
25 with the commercials in the field and determine what
26 commercials need to be transmitted that day. The
27 central computer will direct the headend computer where
28 to write each commercials as part of the daily
29 scheduling process.

30 Central computer 115 also performs billing,
31 traffic, and sales support functions. Central computer
32 115 is capable of creating a bill to each advertising
33 agency reflecting the commercial played (affidavit),
34 location, network time slot, and the bill for the avail.
35 This will be done, for example, daily, summarized
36 weekly, and monthly for actual bill issuance. These
37 billing data are also used to generate the appropriate

1 revenue to the multiple system operators (MSO's)
2 reflecting the usage of their avail.

3

4 Production facilities

5 Production facility 116 is capable of
6 periodically (e.g., daily) producing a set of high
7 quality tapes of all commercials that need to be
8 transmitted to the headends. Control information
9 (commercial identification, synchronization characters,
10 start and stop recording characters) are inserted into
11 the commercials, as supplied by central computer 115.
12 The production facilities personnel are responsible for
13 assembling the proper tapes for transmission as directed
14 by the central computer.

15 When a headend computer 114 notifies the
16 central computer that a record function wasn't handled
17 correctly the production facilities and central control
18 personnel must determine how to best send the commercial
19 to the proper headend. For example, if a relatively few
20 errors are reported to central computer 115 by various
21 headends, the central computer 115 may instruct those
22 headends to substitute a different commercial or to not
23 insert the erroneously received commercial at the
24 appropriate time. Alternatively, if many errors are
25 noted by various headends, central computer 115 will
26 schedule a retransmission time during which erroneously
27 received commercials will be retransmitted for receiving
28 again. In an alternative embodiment, commercials are
29 sent more than once and, if a headend experiences error
30 in receiving a given commercial during its first
31 transmission, it will automatically or in response to
32 instructions from central computer 115, attempt to
33 record the commercial subsequently.

34 Uplink facility 117 is the point where, on a
35 periodic basis, the commercials needing transmission to
36 the various headends are sent via satellite 120.
37 Central control computer 115 determines what
38 satellite/transponder is to be used and provides this

1 information to uplink 117 or to the uplink personnel.
2 At the scheduled time, the tape containing the selected
3 commercials for transmission to the various headends is
4 uplinked to the correct satellite/transponder.

5 In one embodiment, commercials are given a
6 unique eight character identification. This identifier
7 is used for scheduling and for the uplink record
8 processing. The eight character code is inserted in
9 each commercial for future reference. The central
10 computer stores these data in a data file which also
11 contains the name and address of the advertiser and the
12 date the commercial was submitted. Control information
13 about storage is also conveniently included in this data
14 file.

15 Each advertising agency is assigned a unique
16 identifier. This identifier is associated with a
17 commercial used in a particular avail (for billing
18 purposes). The data includes the advertising agency
19 name, address, and any special billing information. All
20 summary billing information utilize this identifier to
21 associate bills to the proper agency.

22 Once a commercial is complete (30 frames per
23 second for the commercial length), the eight character
24 commercial identification is inserted in the vertical
25 interval of the standard NTSC TV signal. These data are
26 used to verify the playing of the commercial on the
27 correct network at the correct time. For recording
28 purposes, the production personnel also add control
29 characters at the beginning and end of the commercial.
30 These control characters are not part of the commercial
31 that will play on the network. Rather, they are
32 stripped off at the headend by the recording process.

33 The invention now being fully described, it
34 will be apparent to one of ordinary skill in the art
35 that many changes and modifications can be made thereto
36 without departing from the spirit or scope of the
37 appended claims.

1 WHAT IS CLAIMED IS

2

3 1. A video system comprising:
4 a source of video spots;
5 a central computer for storing information defining
6 which of said video spots are to be aired on selected
7 ones of a plurality of video distribution systems;
8 transmission means responsive to said central
9 computer for simultaneously transmitting to said
10 plurality of video distribution systems all of said
11 video spots which are to be aired by at least one of
12 said plurality of video distribution systems during a
13 predetermined time period; and
14 for each of said plurality of video distribution
15 systems:

16 means for receiving said video spots
17 transmitted by said transmission means;
18 a headend computer for receiving information
19 from said central computer indicating which of said
20 video spots are to be aired by said video
21 distribution system, and at approximately what
22 time, and on which of a plurality of networks of
23 said video distribution system;

24 recording means responsive to said headend
25 computer for recording said video spots to be aired
26 by said video distribution system during said
27 predetermined period of time;

28 playback means for playing back said video
29 spots as stored by said recording means, at desired
30 times; and

31 means for inserting said spots as played back,
32 on a desired one of said networks.

33

34 2. A system as in claim 1 wherein said playback
35 means comprises a video player and switch means for
36 routing said video spot for insertion to a desired one
37 of said networks.

38

1 3. A system as in claim 2 wherein said playback
2 means further comprises:

3 monitoring means for monitoring a network and
4 detecting a cue tone; and

5 means responsive to said monitoring means for
6 initiating playback of said video spot.

7

8 4. A system as in claim 1 which further comprises
9 means for monitoring said video spots as they are
10 inserted into a network, and storing data relating
11 thereto.

12

13 5. A system as in claim 4 which further comprises
14 means for transmitting said data relating thereto to
15 said central computer.

16

17 6. A system as in claim 1 which further comprises
18 means for monitoring said video spots as they are
19 recorded.

20

21 7. A system as in claim 6 wherein said means for
22 monitoring further comprises means for storing data
23 relating to the recording of said video spots.

24

25 8. A system as in claim wherein said means for
26 monitoring further comprises means for transmitting said
27 data relating to the recording of said video spots to
28 said central computer.

29

30 9. A system as in claim 8 wherein said central
31 computer means further comprises means for
32 retransmitting video spots which have not been properly
33 recorded by one or more of said video distribution
34 systems.

35

1/2

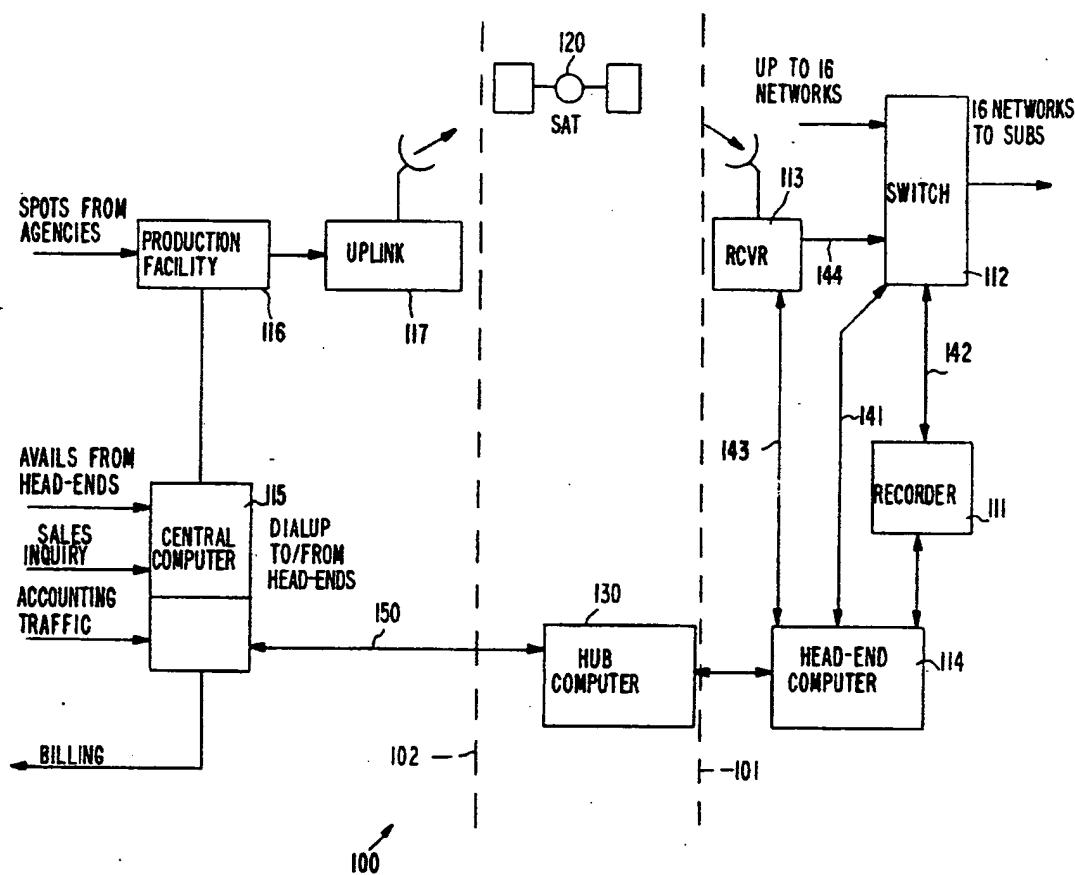


FIG. I

2/2

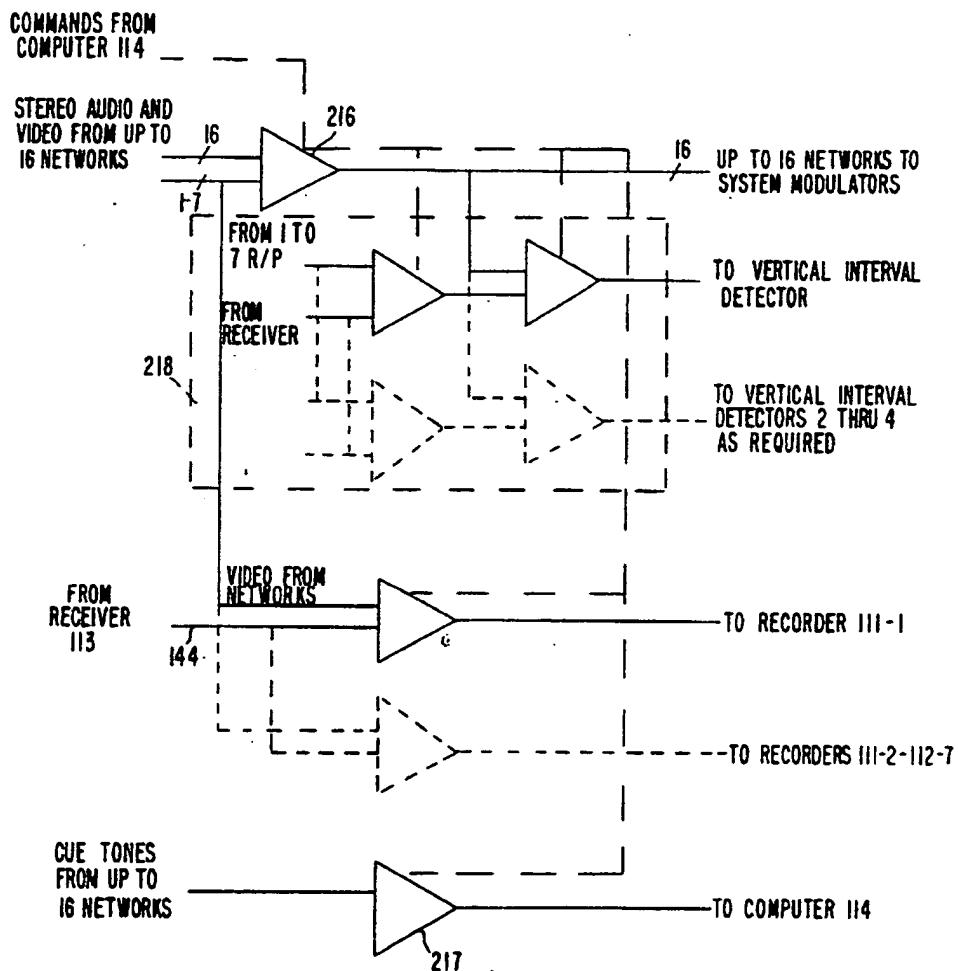


FIG.2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/04081

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(5) :H04N 5/76 US CL :358/335 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 358/84,86,310,342,186; 360/33.1,35.1		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P Y	US, A, 5,029,232 (NALL) 02 July 1991, Figure 1, column 1, lines 27-30, columns 5 and 6 lines 58-68 and lines 1-6 respectively.	1,2,6,7 3,4
Y,P	US, A, 5,029,014 (LINDSTROM) 02 July 1991, Figure 1, column 3.	3,4
A,	US, A, 4,814,883 (PERINE ET AL.) 21 March 1989, See the entire document.	1-9
A	US, A, 4,724,491 (LAMBERT) 09 February 1988, See the entire document.	1-9
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
<p>* Special categories of cited documents:</p> <ul style="list-style-type: none"> *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *A* document defining the general state of the art which is not considered to be part of particular relevance *E* earlier document published on or after the international filing date *L* document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed 		
Date of the actual completion of the international search 30 JULY 1992	Date of mailing of the international search report 08 OCT 1992	
Name and mailing address of the ISA/ Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <i>Robert Chevalier</i> ROBERT CHEVALIER	
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